JOINT FIRE SCIENCE PROGRAM

Fire And Smoke Model Evaluation Experiment (FASMEE)

A Large Integrated Multiagency Fire Study

http://fasmee.net

DOI Office of Wildland Fire

USGS science for a changing world

FASMEE Project Leads:

Roger Ottmar, USFS, Seattle ,WA

Sim Larkin, USFS, Seattle, WA

Tim Brown, DRI, Reno, NV

Nancy French, MTU, Ann Arbor , MI

FASMEE Objective

To provide innovative and efficient measurement techniques to collect critical observational data necessary to evaluate and advance operationally used fire and smoke modeling systems and their underlying scientific models.

FASMEE Overview

- Large field campaign
  - >500 acre prescribed burns
  - Intensively instrumented
    - 120 + scientists & technicians
    - 20 + government agencies and Universities
  - High end of fuel load and intensity
- Study sites in the
  - Southwest US
  - Southeast US
- Interrelated disciplines
  - Fuels and consumption
  - Fire behavior and energy
  - Plume development and meteorology
  - Smoke emissions and chemistry
  - Modeling
- Core set of targeted measurements
  - Designed by discipline and modeling leads
  - Fuel and fire characterized to support plume and smoke measurements
- Integrating with FIREX (NOAA), FIREChem (NASA), and EPA
- Opportunity for additional measurements and agency partnerships (i.e. ECOFASMEE)

FASMEE Phase 1 (Planning) Science Team

April 2016-June 2017

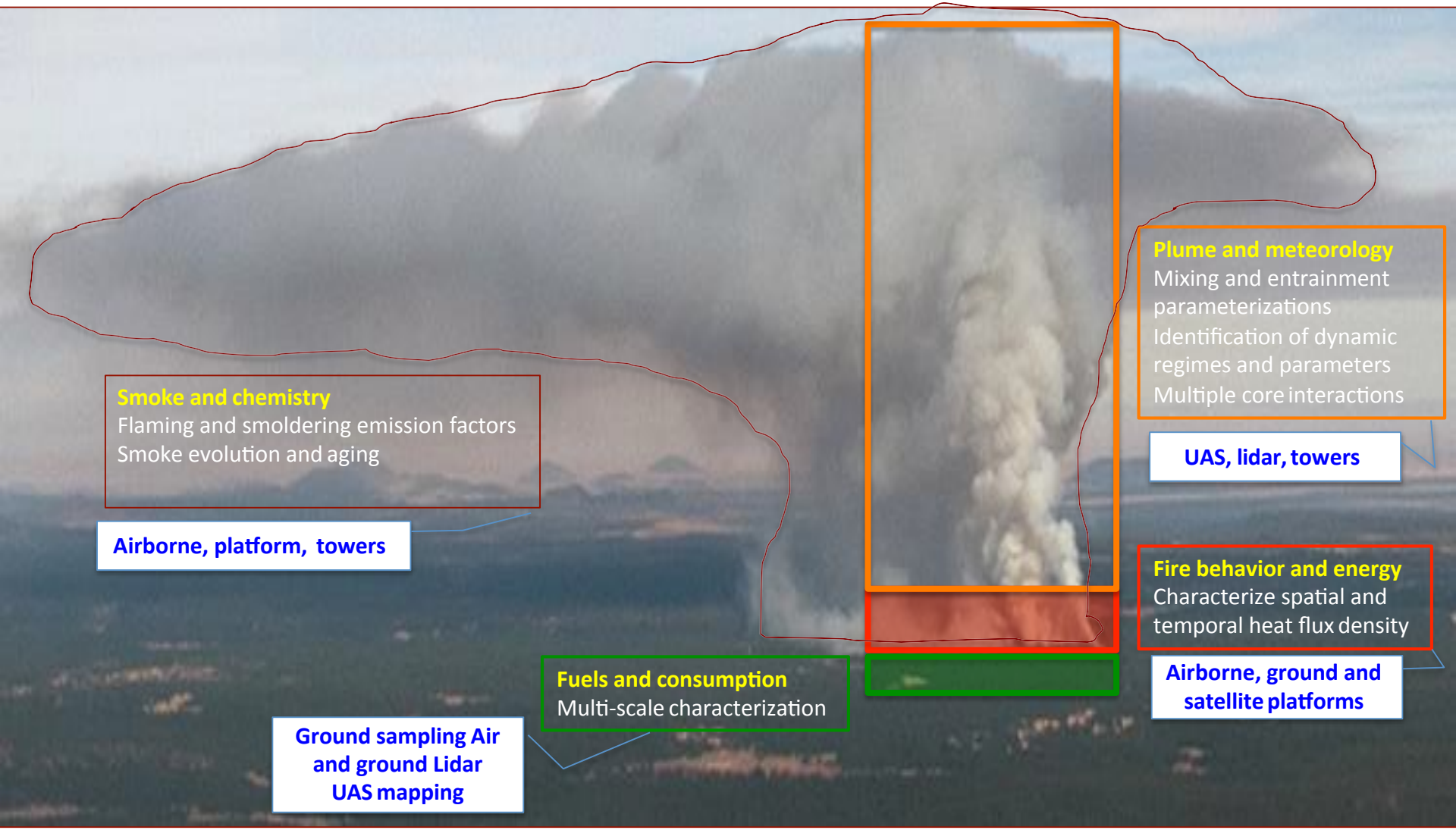
FASMEE Leadership Team	**Roger Ottmar**, USFS PNW (PI) **Tim Brown**, Desert Research Institute **Nancy French**, Michigan Tech **Narasimhan (Sim) Larkin**, USFS PNW **Adam Watts**, (technical lead) **Susan Prichard**, (technical lead)
Discipline 1: Fuels	**Andy Hudak**, USFS RMRS (PI) **Robert Keane**, USFS RMRS **Louise Loudermilk**, USFS SRS **Russ Parsons**, USFS RMRS **Susan Prichard**, University of Washington **Carl Seielstad**, University of Montana **Nicholas Skowronski**, USFS NRS
Discipline 2: Fire Behavior	**Matt Dickinson**, USFS NRS (PI) **Bret Butler**, USFS RMRS **WeiMin Hao**, USFS RMRS **Joe O'Brien**, USFS RMRS **William Schroeder**, University of Maryland
Discipline 3: Meteorology and Plume Dynamics	**Brian Potter**, USFS PNW (PI) **Craig Clements**, San Jose State University (co-I)
Discipline 4: Smoke Emissions and Chemistry	**Shawn Urbanksi**, USFS RMRS (PI)
Modeling – WRF-SFIRE/WRF-SFIRE-CHEM	**Adam Kochanski**, University of Utah (PI) **Aimé Fournier**, University of Colorado **Mary Ann Jenkins**, York University / University of Utah **Jan Mandel**, University of Colorado
Modeling – WFDS/FIRETEC	**Ruddy Mell**, USFS PNW (PI) **Rod Linn**, LANL (co-I)
Modeling – CMAQ / EI / EPA regulatory modeling	**Kirk Baker**, EPA (PI) **Brian Gullet**, EPA **Tadeusz Kleindienst**, EPA **Tom Pierce**, EPA **George Pouliot**, EPA **Matthew Landis**, EPA **Rohit Mathur**, EPA **Venkatesh Rao**, EPA **Alan Vette**, EPA (co-I)
Modeling – Prescribed fire / southeastern modeling	**Yongquiang Liu**, USFS RMRS (PI) **Gary Achtemeir**, USFS, emeritus **T. Oddman**, University of Georgia **Scott Goodrick**, USFS RMRS (co-I)

FASMEE Phase 2

Large Field Campaign

- Study sites in SW and SE USA
- Interrelated disciplines (fuels, fire behavior, plume dynamics, smoke)
- Integrating with FIREX (NOAA), FIREChem (NASA), and EPA

Key model improvements and evaluation



Connection with FIREX and FIREChem

- How can FASMEE, FIREX, and FIREChem benefit each other?
- What connections have been made so far?
- Linkage to FASMEE Timing

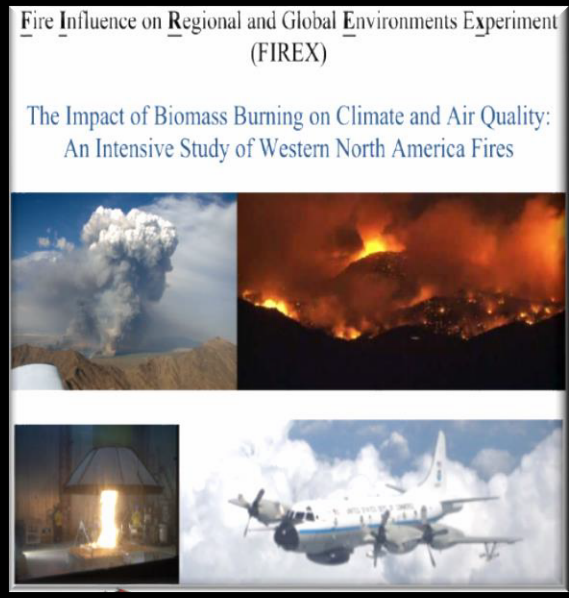
FIREX & FIREChem

FIREX:

- NOAA sponsored 5 year experiment
- NOAA and external scientists
- Major sources of funding:
  - NOAA CSD (int), NOAA AC4 (ext)
  - Total budget: ~$24M
- Multiple phases –
  - 2016 Fire lab burn chamber studies
  - 2017 Storm Peak lab measurements
  - 2019 Western wildfire field campaign focused on aircraft measurements
    - P3 Orion + other aircraft

FIREChem:

- 2017 NASA Tropospheric Chemistry RFP
- Includes support for FIREX, FASMEE
- NASA DC8 Aircraft



Potential Mutual Benefits
Uniqueness of Opportunity

- Extends wildand fire smoke understanding that goes beyond achievement by an individual agency or program
- Characterizes the entire wildland fire emissions chain including fuels, fire, plume dynamics and smoke, chemistry and transport
- Advances collaborative science within federal agencies
- Best interest of respective organizations

Current Status of Connections between FASMEE, FIREX, FIREChem

Agreement in principal to join efforts

- FASMEE burns timed to match availability of FIREX / FIREChem aircraft
- FIREX / FIREChem aircraft windows being shifted to provide some overlap with FASMEE Rx burn window
- Requested FASMEE to assist in characterizing wildfires flown by FIREX / FIREChem aircraft

Letter of Intent supporting Joint Interagency Coordination

"F3" Committee Calls

FASMEE 2 Timing

Timing of FON

- **Scheduled for September 2017**

FASMEE Field Campaigns

- Research burns scheduled for 2019 and beyond

FASMEE Burn Timeline Options

Timing

Southwest Burn Window
Sep-Oct: both Fishlake, UT and Kaibab, AZ
May-June: Fishlake, UT only
Matches with FIREX & FIREChem campaigns

Southeast Burn Windows
Feb-March: Dormant Season, Fort Stewart, GA
April-May: Growing Season, Fort Stewart, GA
Matches with FIREChem campaign

Site Selection

- FASMEE research areas
  - Southwestern US
    - Mixed conifer/dry ponderosa fuel load (20-150 t/a)
    - Stand replacement/higher intensity fires
    - September/October-2019, May/June-2020
  - Southeastern US
    - Long-leaf pine plantation, 3-5 year rough (20+ t/a)
    - February–April 2021-2022

- Hosts

  Southwest
  - Fishlake/Dixie National Forest (mixed conifer/aspen)
  - Kaibab National Forest and Grand Canyon (pp pine or mixed conifer site)

  Southeast
  - Fort Stewart (southern pine)
  - Savannah River Site (alternate)


Manning Creek unit fuels


Manning Creek Unit (1000+ acres)
Fishlake NF


Small unit 50-200 acres
Fishlake NF


Small unit burn example
from June, 2016


Questions and Discussion